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PERFORMANCE ORIENTED PACKAGING TESTING

OF

NINE MK 3 MOD 0 SIGNAL CONTAINERS

IN PPP-B-621 WOOD BOX

FOR PACKING GROUP II SOLID HAZARDOUS MATERIALS

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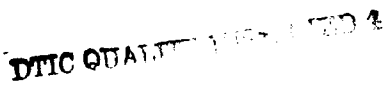
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## INTRODUCTION

A wood box containing nine MK3 Mod 0 Signal Containers was tested to ascertain whether the container would meet the requirements of the Code of Federal Regulations, Title 49 CFR, Parts 107 through 178, dated 31 December 1991. The objectives were to evaluate the adequacy of the container in protecting and retaining the contents when secured with appropriate dunnage.

The MK 3 Mod 0 Signal Container is a sealed aluminum container used primarily for shipment and storage of small signals and signal kits. Nine of these containers are typically packed in a PPP-B-621 wood box for shipment. Figure 1 shows the wood box with its lid removed and the MK 3 containers in place. The closed container is shown in Figure 2, as it was tested.

## TESTS PERFORMED

### 1. Drop Test

This test was performed in accordance with Title 49 CFR, Part 178, Subpart M, Sec. 178.603. Five containers were used during the test series, one for each drop orientation. The drop height was 1.2 meters and the drop sequence was as follows:

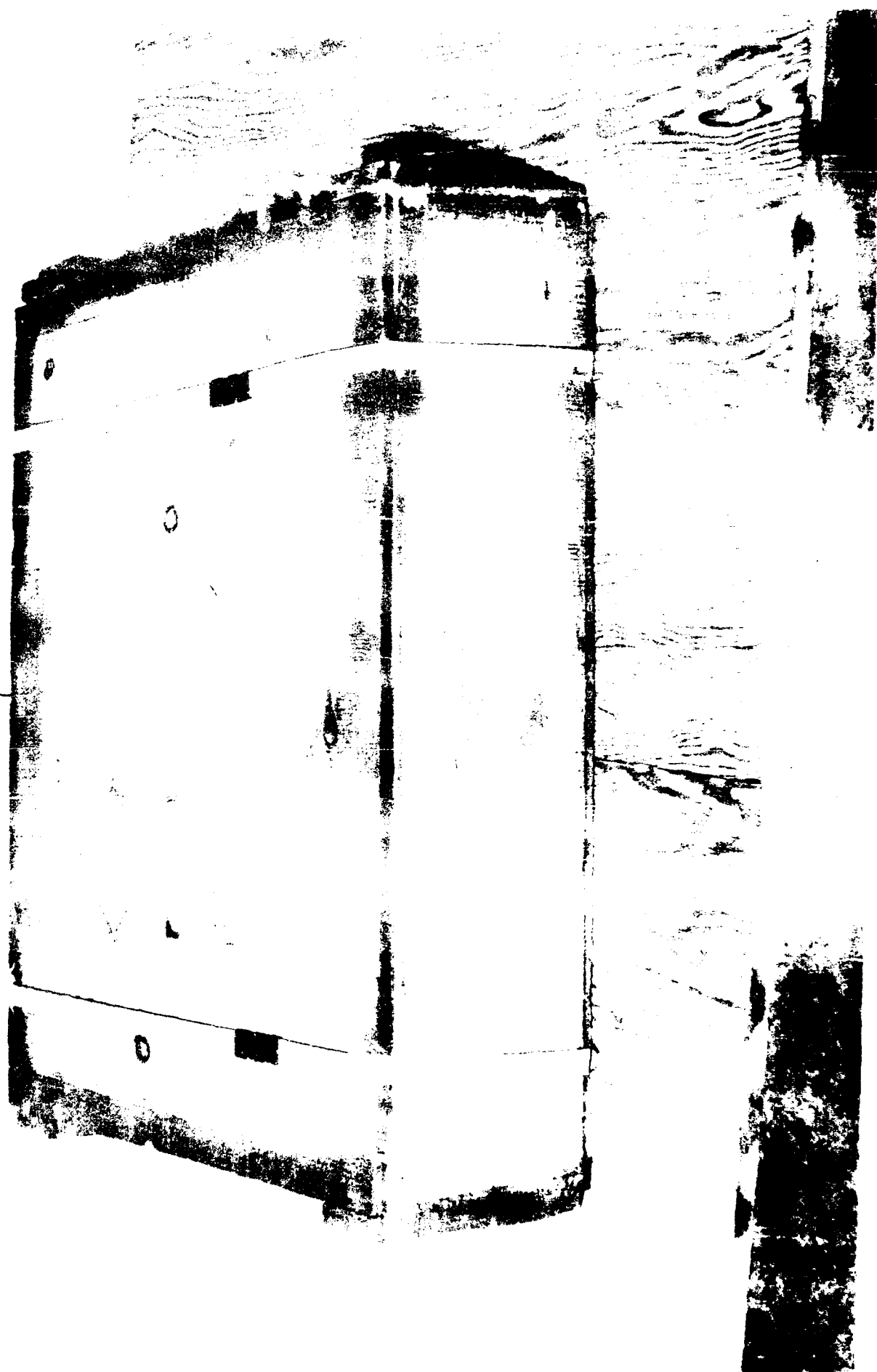
- a. Flat on Bottom
- b. Flat on Top
- c. Flat on Long Side
- d. Flat on Short Side
- e. On a Corner

The test was performed at ambient temperature ( $70^{\circ} \pm 20^{\circ}\text{F}$ ). The contents of the container should be retained within its packaging and exhibit no damage liable to affect safety during transport.

### 2. Stacking Test

This test was performed in accordance with Title 49 CFR, Part 178, Subpart M, Sec. 178.606. Three different containers were used, each with a stack weight of 2600 pounds. This weight represents the load superimposed on the bottom container of a sixteen-foot stack of like containers weighing 124 pounds each. The test was performed for 24 hours. After the allowed time, the weight was removed and the container examined. Any leakage, deterioration, or distortion which could adversely affect transport or reduce its strength or cause instability in stacks of packages is cause for rejection.





### **3. Base Level Vibration Test**

This test was performed in accordance with Title 49 CFR, Part 178, Subpart M, Sec. 178.608. Three sample containers were loaded with nine sand-filled MK 3 containers and closed as for shipment. Each container was placed on a vibrating platform that had a vertical double-amplitude (peak-to-peak displacement) of one inch. The packages were constrained horizontally to prevent them from falling off the platform, but were free to move vertically, bounce and rotate. The test was performed for one hour at a frequency that caused each point of the container bottom to be raised from the platform to such a degree that a 1.6mm thick metal strip could be passed between the bottom of any package and the platform.

#### **PASS/FAIL**

##### **1. Drop Test**

The criteria for passing the drop test is outlined in Title 49 CFR, Part 178, Subpart M, Sec. 178.603(f): A package is considered to successfully pass the drop test if for each sample tested, no rupture occurs which would permit spillage of loose explosive substances or articles from the outer packaging.

##### **2. Stacking Test**

The criteria for passing the stacking test is outlined in Title 49 CFR, Part 178, Subpart M, Sec. 178.606: No test sample may show any deterioration which could adversely affect transportation safety or any distortion likely to reduce its strength, cause instability in stacks of packages, or cause damage to inner packagings likely to reduce safety in transportation.

##### **3. Base Level Vibration Test**

The criteria for passing the Base Level Vibration Test is outlined in the Title 49 CFR, Part 178, Subpart M, Sec. 178.608: Immediately following the period of vibration, each package must be removed from the platform, turned on its side and observed for any evidence of leakage. A packaging passes the vibration test if there is no rupture or leakage from any of the packages. No test sample should show any deterioration which could adversely affect transportation safety or any distortion liable to reduce packaging strength.

#### **TEST RESULTS**

##### **1. Drop Test**

Satisfactory.

##### **2. Stacking Test**

Satisfactory.

### **3. Base Level Vibration Test**

Satisfactory.

## **DISCUSSION**

### **1. Drop Test**

After each drop the container was inspected for any damage which would be cause for rejection. Final inspection revealed minor damage to the boxes, but no spillage of contents.

### **2. Stacking Test**

Three containers were individually tested. Each container was visibly inspected after the 24-hour period was over. There was no leakage, distortion, or deterioration to the container as a result of this test.

### **3. Base Level Vibration Test**

Immediately following the vibration test, each container was removed from the platform, turned on its side and observed for any evidence of leakage. The box remained intact and there was no evidence of leakage of contents.

## **REFERENCE MATERIAL**

Code of Federal Regulations Title 49 CFR, Parts 107-178.

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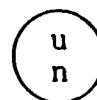
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# DATA SHEET

**CONTAINER:**

Wood Box Containing  
Nine MK3 Signal Containers

**POP MARKING:**

4C1/Y56/S/\*\*  
USA/DOD/NAD

Type: 4C1

UN Code: 1.4G

Specification Number:  
PPP-B-621

Material:  
Wood

Gross Weight:  
56.0 kg  
(123.3 pounds)

Dimensions:  
.72 m L x .57 m W x .22 m H  
(28.5" L x 22.56" W x 8.62" H)

Closure (Method/type):  
Steel strapping  
(2 places)

Tare Weight:  
6.4 kg  
(14.0 pounds)

Additional Description: PPP-B-621 box, Class 2, Style 4,  
Type 1, Inside dimensions 27.00 x 21.56 x 6.88 +.12 inches.  
Lid fastened to box with strapping only, not nailed.

**PRODUCTS:**

See Table I

Proper Shipping Name: Signal Devices, Hand

United Nations Number: 0191

United Nations Packing Group: II

Physical State: Solid

Amount Per Container:  
See Table I

Net Weight: Varies

**TEST PRODUCT:**

Name: Sand

Physical State: Solid

Size: N/A

Quantity: N/A

Dunnage: None

Gross Weight: 56.0 kg (123.3 lbs.)

TABLE I

NALC/ DODIC	NSN	ITEM	PACKING DRAWING	# PER CNTR.	GROSS WT. (KG)
L275	1370-00-309-5028	MK13-0 SIGNAL	3139738	108	49.9
L283	1370-01-030-8330	MK124-0 SIGNAL	3139738	108	49.9
L563	1370-01-366-0343	MK188-0 SIGNAL KIT	6869829	9	32.3
L564	1370-01-366-0344	MK189-0 SIGNAL KIT	6869831	9	35.2